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Alex Dreier, "Man on the Go," visits a Western Society meeting.

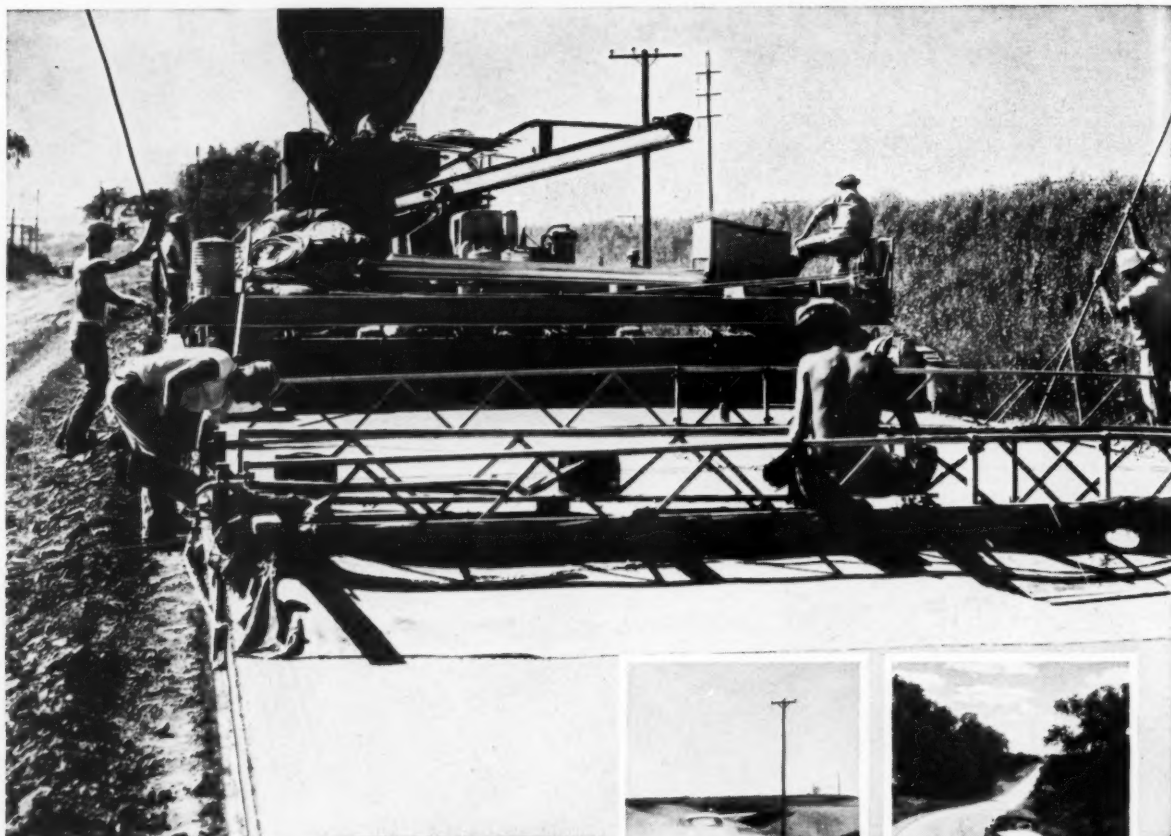


THE ROLE OF GAS
IN MEETING FUTURE ENERGY DEMANDS — PAGE EIGHT

Vol. 12

MAY, 1960

No. 10



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COVER STORY

Alex Dreier, described as the "Man On The Go," gave the Coffee Talk at the Western Society's General Meeting of April 26, 1960. Mr. Dreier, noted news commentator with the National Broadcasting Company, gave his view of "Where Do We Go From Here?"

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M. J. Adams, left, who introduced H. L. Wyckoff, right, await their audience in the Large Auditorium.



H. L. Wyckoff begins his talk on "Direct Conversion—A New Age in Power Generation."



Frank V. Koval, left, who later spoke on the Northwestern's suburban service, and A. M. Westenhoff, who introduced him.



WSE 1st V-P R. D. Maxson, left, and coffee-talk speaker Lewis A. Evans, who spoke on rail terminal consolidation.



WSE Trustee Carl Metz, left, listens to the internationally noted news commentator, Alex Dreier.



G. W. Trout, left, and WSE Treasurer E. R. Hendrickson, listen to a discussion at their right.

Ingvar Schousboe, left, and R. N. Bergstrom. Schousboe spoke on "The Design and Construction of the Chicago Exposition Center."



Program Chairman H. R. Heckendorn, left, and speaker Fred Skinner, are amused by a just-taken photograph.



TWO MEETINGS AT WESTERN

• March 22

"Consolidation of Railroad Terminals" was the subject covered by the coffee speaker at the Western Society's General Meeting of March 22, 1960.

The speaker was Lewis A. Evans, president and general manager of the Chicago & Western Indiana Railroad Company and The Belt Railroad Company of Chicago.

Mr. Evans considered the subject from the viewpoint of an engineer. He admitted that many possible audiences would not be able to discuss the consolidation of railroad terminals as objectively and rationally as could members of the Western Society of Engineers.

Technical Session Number 1

The speaker at the first of two simultaneous technical sessions was H. L. Wyckoff, research engineer with Commonwealth Edison Company. Mr. Wyckoff spoke on "Direct Conversion—A New Age in Power

Generation." He gave a survey of some of the fundamental concepts of direct conversion principles.

This Technical Session was under the sponsorship of the Electrical Engineering Section. Edgar Rogers is chairman of this section.

Technical Session Number 2

At the second of the simultaneous technical sessions Mr. Frank V. Koval, assistant to the president of the Chicago & Northwestern Railway Company, spoke on "Northwestern Suburban Service: Where is it Headed?" Mr. Koval told the great plans that the Northwestern Railway has developed for the betterment of suburban trains. For instance, all suburban trains should be air conditioned by the end of the summer of 1961.

Technical Session Number 2 was sponsored by the Transportation Engineering Section, under the chairmanship of A. M. Westenhoff.

• April 26

Alex Dreier, "Man On The Go," spoke over coffee at the Western Society General Meeting of April 26. Few in the audience, if any, paid much attention to coffee cups as Dreier talked, however. Who could withdraw his attention from such an interesting, fascinating speaker?

Mr. Dreier gave some autobiographical material, some information on the people, places, and events that he has encountered, and some ideas, thoughts, and opinions that he has held and may even yet hold. He also told of some opinions he holds that he never held before.

Mr. Dreier's picture appears on the cover of *Midwest Engineer*.

Technical Session Number 1

Technical Session Number 1 featured Ingvar Schousboe, project engineer with Shaw Metz and Associates. Mr. Schousboe spoke on "The

Design and Construction of the Chicago Exposition Center." His discussion covered the various designs which were considered for the Center, and some of the construction problems that arose, and how they were resolved.

The Bridge and Structural Engineering Section, of which R. N. Bergstrom is chairman, sponsored this technical session.

Technical Session Number 2

The Communications Section, with G. W. Trout as chairman, sponsored Session Number 2.

The "Ballistic Missile Early Warning System" was discussed by Mr. Fred Skinner, superintendent of Transmission Engineering in the Defense Projects Division of the Western Electric Company. Mr. Skinner told of the communications network underlying our latest system for defending the country against ballistic missiles.



Above, left, two one-third horsepower units maintain the side of a 200-foot pier free from ice. Above, right, George



Gross and William Cramer help Jim Thorne prepare to take underwater photographs of the ice.

WATER MANIPULATION

By George E. Gross

The basis for a new industry, via sub-surface or water manipulation, began to develop through the efforts of a group of underwater research men in the Chicago area. Underwater water manipulation had its actual beginning just a few short years ago in the mind of George E. Gross. Mr. Gross was at that time employed in the mechanical engineering department of one of the nation's largest research organizations, Armour Research Foundation of Illinois Institute of Technology.

Man has learned that nature is in a relatively delicate balance, and with the right key, so to speak, and with a little effort, the properties of matter and the power in nature can be upset and controlled in a way to produce more and better things for more people.

Through the testing of hypotheses, and observance, and through the use of a more than average amount of

This article presents essentially the contents of the talk given by Mr. Gross before the West Suburban Division of the Western Society of Engineers on March 9, 1960.

"serendipity*" in water manipulation, new products have been developed in many fields. These fields include water, food, medicine, and defense. A number of companies are interested in the developing products, and are listed for licensing when the products in their field are developed. In the last year approximately 30 "patent pendings" have been placed in the mill, and it appears that the surface of the expanding new industry has only been scratched.

The first product which started the "ice" or "snowball," so to speak, was one designed for the protection of a pleasure-craft pier. The question was asked, "Why not use the pier longer . . . start using it sooner, use it later, and do away with the expense of ice

removal?" This question was answered with the pipe-type of "Aqua-Therm." The "Aqua-Therm" (literally "water heat") was developed to drive the warm water directly from the bottom of the lake or other body of water to the surface through a number of small water jets. The Aqua-Therm for producing the jets to penetrate the surrounding water and deposit the warmer water in a layer on the surface was developed by George Gross. One of the keys to nature, a small difference in temperature, changes water density and viscosity to the point where water does not know itself and will not mix. With the Aqua-Therm, the jets do not mix with the surrounding water and very little effort is required to upset nature for an unexpected bene-

*Discovering something not in quest of.

fit to man: surface water stays free of ice.

The next problem on ice control: Develop a system to cover large areas and to do this without the pipes, useful at greater depths, and without a great amount of power. A more direct method was indicated. To best accomplish this, a comprehensive series of tests had to be made, observed, and, if possible, photographed. In the development of a new system, George Gross and Donald Johnson could run the tests, but the best possible pictures were desired. The group inquired as to the name of the individual who would be tops in underwater photography. Through contacts, Jim Thorne was selected, and he consented to do the job. Soon Jim was a full-fledged member of the research group.

Gross, through "serendipity," designed and established the proto-type of the new units, incorporating an unusual propeller system. William Cramer, one of the founders of the system, made the calculations necessary for the prototypes. Mr. Keith Hill, chief engineer, New Products Development of the Besly-Welles Corporation, South Beloit, Wis., the licensee of the systems, completed the ice control prototypes called "Aqua-Therm." As shown at top, left, Page 6, two 1/3 horsepower units opened up the ice around a 200 foot pier at Lake Geneva, Wisconsin. The principle was established, and requests came in from all over the country.

Achieving aeration, originally only a secondary problem as a side effect of open ice, moved up equal to the control of the ice itself. Gross designed a proto-

type and, today, the Besly-Welles Corporation has units which put 9 cubic feet of air per minute into the water without the use of a compressor. These 1/3 horsepower units can produce an aerated shaft of water 20 feet in width and in excess of 600 feet in length, it has been verified.

A number of tests proved that the shaft of water from one of these units can be controlled much as billiard balls are. The shaft of water directed in one direction can be deflected easily by deflection plates and caused to go in a circle. This means that even in the ocean, local areas can be aerated for the raising of fish for food. Through controlled areas the fish will act as if in a ranch corral. In some cases, with large fish, jet streams or bubble curtains around aeration units, operating in a circular pattern, may be required. This air curtain will prevent the fish from leaving the area. Some theoretical calculations indicate that units moving 1,500,000 GPH of water can be designed.

The process of combining SCUBA (Self Contained Under Water Breathing Apparatus) diving with research-minded-engineers was the key to this incipient industry. The scientists, engineers, and others engaged in these projects can definitely and literally say that they are so busy they can't keep their heads above water.

The water cowboy of the future, in herding fish, will be a SCUBA diver . . . not riding a sea horse, but being propelled by small units as depicted for the space age. These are under development by Mr. Gross' organization and

are an outgrowth of the special propellers and the small "Acqua-Therm" units. Future plans will call for underwater farms.

These underwater pioneers will carry firearms of a different type. Under development, another Gross invention, is the "Adventure Dart." This is expected to be marketed in 1960 with other inventions which are in the process of licensing at this time. The "Dart," growing out of Gross' wartime research experience in explosives, is to be used primarily for protection against predatory fish and for escaping from under the ice. Using a low frequency shock wave from the exploding charge, it was discovered that the results were greater than expected and that there was no effect on the diver. Initial tests covered between 300 and 400 prototypes. To reduce operating costs, the prototypes were made out of wood, paper, and string. Literally, if some part of one became detached, it was reattached with a stick of chewing gum. The research group conducted tests in Lake Geneva, Wisconsin, in quarries, and in Lake Michigan.

Jim Thorne, who conducted most of this activity, tested modified "Dart" units and opened up 30 inches of ice as an escape hole within 15 seconds. He was underwater within 18 feet of the missile when it fired. No effects were felt by Mr. Thorne.

The "Dart" gives the kind of protection that can save the life of an ice diver. Ice diving has become a popular sport and, with the advent of the "Dart," losing one's way under the ice need no longer be a serious hazard.



Jim Thorne comes up through a hole in the ice made by the "Dart." The ice was 30 inches thick.



Donald Johnson in a photograph taken at Rainbow Springs, Florida. Johnson is preparing to launch a "Dart."

THE ROLE OF GAS IN MEETING FUTURE ENERGY DEMANDS

By Dr. Martin Anderson Elliott

INTRODUCTION

We, in the gas industry, are well aware of the significant role being played by gaseous fuels in helping to meet what seems to be an insatiable demand for energy in the United States. We also know that our industry's planning and research is directed broadly toward improving the competitive position of gaseous fuels to ensure that gas will continue to be one of the major suppliers of energy in the future. But, to gain perspective in considering the future role of gas as a source of energy we need to examine the magnitude of the total energy de-

mand projected for the future, the fraction of this total demand likely to be supplied by gas, and the probable availability of natural gas and of other fossil fuels for producing supplemental gas. It is, therefore, the purpose of this discussion to review pertinent studies on the overall energy problem with particular emphasis on the role of gaseous fuels in helping to meet future energy demands

of the United States. This review will cover the period from the present to the end of this century.

TOTAL DEMAND FOR ENERGY

General

Throughout the ages, man's social, economic and technical progress have gone hand in hand with his progress in

Dr. Elliott, Director of the Institute of Gas Technology, Chicago, presented this talk before a Technical Session of the Western Society of Engineers on February 23, 1960, at the Society's Headquarters in Chicago.

utilizing energy effectively. The evidence supporting this statement will be found not only in past history, but also in comparisons of the more-advanced and the less-advanced nations in the world today. Invariably such comparisons show that the standard of living is related to the per capita use of energy. Thus, in those countries having advanced technologies and industrial economies, the total demand for energy has increased enormously in the present century. In fact, it has been said that we are in the midst of an "Energy Revolution" which is making possible realization of the full potentialities of the Industrial Revolution by fuelling its machines. In view of this, we can expect our demands for energy to continue to increase. Therefore, projection of total energy demand is one of the first steps in planning to meet these demands in the future.

Projecting Energy Demands

Increasing interest in the overall energy problem in the past decade has brought forth an imposing number of long-range projections of the demand for all forms of energy. In general, these projections had different objectives, with attendant differences in basic assumptions and methods used. Also, the projections range from 5 to 50 years in the future. In spite of this diversity, it is interesting to compare them and to outline briefly some of the basic considerations in making such projections.

The two following methods for estimating future energy demand will be discussed:

1. Total input energy = $\frac{\text{Population} \times \text{effective energy used per capita}}{\text{Efficiency of utilization}}$
2. Total input energy = $\frac{\text{Gross national product (GNP) in constant dollars}}{\text{input energy per dollar of GNP}}$

Both of these methods involve projections of the future growth of the population. Population enters directly in Method 1 and indirectly in Method 2 because GNP is a function of population. Projections ranging up to 25 years generally use Series A of the Census Bureau projection, which assumes that the 1950-53 growth rate continues to 1975, indicating a population of about 222 million at that time. One longer-term projection extending up to 50 years has assumed that the growth rate in 1952 would decline linearly to zero in the year 2050. This projection indicates a population

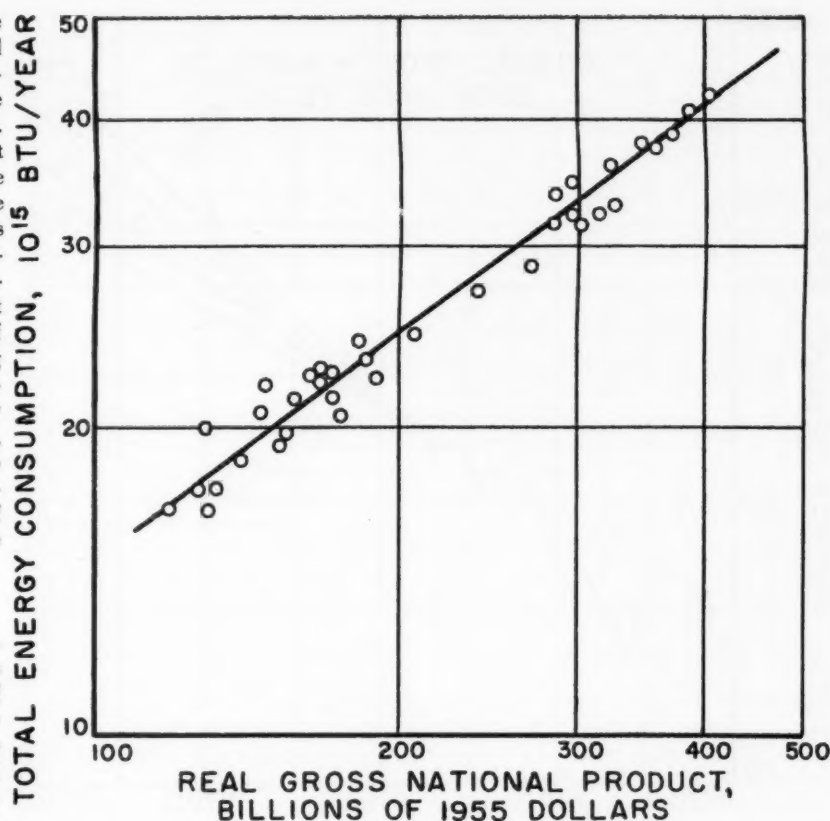


Fig. 1. Relation between annual consumption of energy and gross national product, 1920-1957.

of 225 million in 1975 and nearly 300 million in 2000. The present U. S. population is about 176 million. Since population is such an important factor in predicting future demands of energy, it

time from about 8 percent in 1860 to 30 percent in 1950. In projecting this increase into the future it has been assumed that a maximum efficiency of 43 percent will be approached in the year 2050. Shorter range projections use a variant of Method 1 by assuming that the efficiency will not change significantly during a relatively short period. With such an assumption the projection is made on the basis of the input energy per capita.

should be recognized that the accuracy of the energy projection depends to a great extent on the accuracy of the population projection.

In the first method listed above, it is necessary to project, in addition to the population, the effective energy used per capita and the efficiency of utilization. By effective energy is meant the actual energy used in a particular application. For example, it is the energy applied to the rails by a locomotive, and the energy delivered as useful heat in a house-heating application. The efficiency of utilization has increased progressively with

The second method is based on the relationship between total energy consumption and GNP in constant dollars. This relationship is shown in Fig. 1 for the period 1920 to date. It is apparent that the correlation between these two quantities furnishes a basis for the projection. The actual projections based on this relation involve the use of energy per dollar of GNP which has been decreasing at an annual rate of about 1 percent. Method 2 has been used by the National Planning Association and was checked roughly by independent projec-

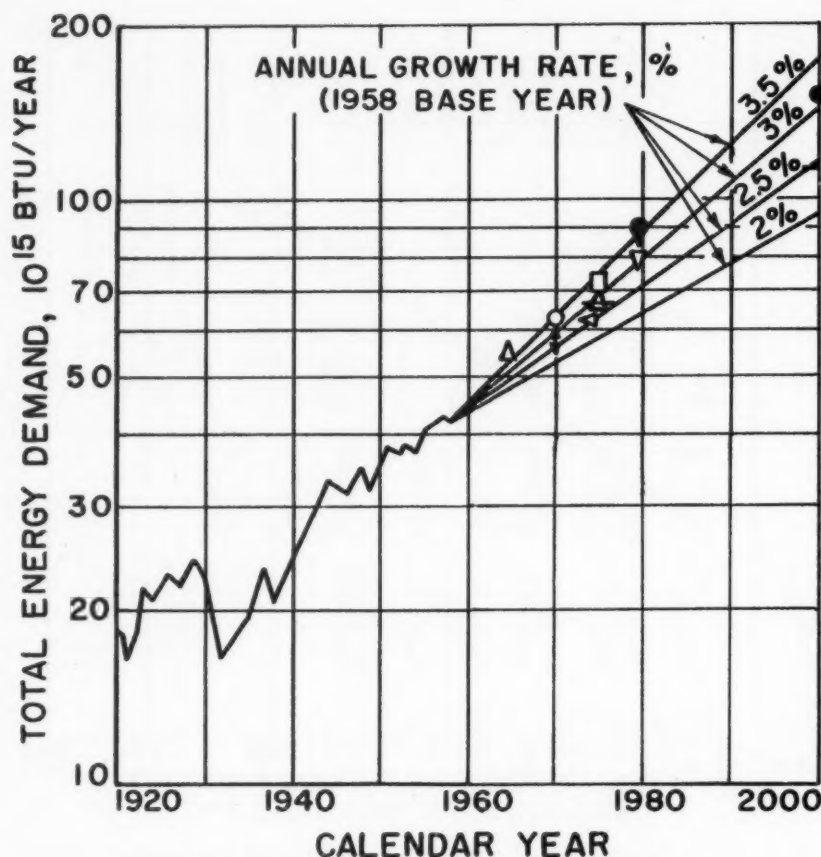


Fig. 2. Comparison of projections of total energy demand.

tions of the demand for individual components of the energy system.

Various projections of total energy demand are shown in Table 1. The annual growth rate for projections in the period 1970-2000 ranges from 2.3 to 3.3 percent and average 2.8 percent. Slightly higher growth-rates are indicated in shorter-range projections. The various projections are shown in Fig. 2 along with lines of constant growth rate above the 1958 level. Even with 1958 as the base year the growth rates are close to

those shown in Table 1 in most instances. In the range of annual growth rate of 2.5 to 3.0 percent, the total energy consumption in 1980 will be about twice the 1955 level, and in the year 2000 will be about three times the 1955 level. Fig. 2 shows that differences in growth rate of the order of 0.5 percent are responsible for a difference of approximately 20 percent in the energy demand projected 40 years in the future.

In planning to meet future energy demands it is important not only to know

the yearly demand, but also the cumulated demand for the period in question. This cumulated demand may then be compared with the estimated reserves of fossil fuels and of other sources of energy. For an annual growth rate of 3 percent, the cumulated demand for energy from fossil fuels and water power between 1958 and the year 2000 would be 3.48×10^{18} Btu. For convenience, 10^{18} Btu or ten trillion therms of natural gas is designated as Q. Some conception of the magnitude of this unit may be gained when it is realized that one Q of natural gas would be contained in a pipeline 50 feet in diameter extending from the earth to the sun. The cumulated consumption of energy from 1800 to 1955 was 1.28 Q. Thus, in the next 42 years, we will use about two and three-quarters times as much energy as we used in the past 158 years.

MEETING TOTAL ENERGY DEMANDS Fossil Fuels

In the past, fossil fuels—coal, petroleum and natural gas—have supplied the bulk of our energy requirements. In looking toward the future we must consider the reserves of fossil fuels in relation to the projected cumulated energy demand. Recent estimates of the total future reserves of fossil fuels in units of Q are shown in Column 1 of Table 2. The estimates are based on physical quantities in place, and no cognizance has been taken of the effect of economic factors on the actual production or recovery of these reserves. In the case of coal, the economic effect can be approximated by considering only those reserves existing in seams thicker than 28 inches and at depths of less than 2000 feet which could be recovered at or near present prices. Column 2 of Table 2 shows that about 25 per cent of the coal reserves meet this requirement. In the case of crude petroleum and natural gas it will be assumed that the estimated ultimate reserves are all economically recoverable. In the case of oil shale it is assumed that 75 per cent will be recovered in mining, and that 90 per cent of the mined shale can be recovered as shale oil. Considering coal, oil, natural gas and the Green River shale, we could produce useable energy from our fossil fuels equivalent to 12.6 Q at or near present prices. Shales other than those in the Green River formation have not been included because the extent of the reserves of such shales, although large, is not as

Table 1—Projections of Total Energy Consumption*

Projector	Reference	Year	Base Value, 10^{15} Btu	Projection, 10^{15} Btu						Annual growth rate, %
				1965	1967	1970	1975	1980	2000	
Ayres & Scarlott	5	1947	35.1			61.6				2.5
Putnam	1	1949	31.4						150	3.1
PMPC	6	1950	34.6				67			2.7
McKinney Panel	2	1954	37.4					87.5		3.3
Sporn	7	1955	40.3				72			2.9
NPA	4	1955	40.3					80		2.8
Parson	10	1955	40.3						112	2.3
Coqueron et al	11	1957	42.1		63.5					4.2
Davis & Schweizer	9	1958	41.9			57				2.6
Melnick	8	1958	41.9	55.1						3.9

*Adapted from a publication of the National Planning Association, 1958.

Table 2—Future Fossil Fuel Reserves

	Total	Recoverable as Primary Fuel	Recoverable as Fluid Fuel	Cumulated U.S. Energy Demand, 1959-2000
Coal	20.5 Q*	5.1 Q**	3.0 Q	
Crude Petroleum	1.1 Q	1.1 Q	1.1 Q	
Natural Gas and natural gas liquids	1.5 Q	1.5 Q	1.5 Q	
Oil shale				
Green River	7.2 Q	4.9 Q	4.9 Q	
All other	11.8 Q			
Total	42.7 Q	12.6 Q	10.5 Q	3.5 Q

* Q = 10^{15} Btu = 10 trillion therms of natural gas.

** An additional 6.2 Q could be recovered at 1.25 to 1.50 times present prices.

well known. If we assume that all fossil fuels are converted to fluid fuels, then the losses in conversion will reduce the energy available from our reserves to 10.5 Q. This value may be compared with the cumulated energy requirement of about 3.5 Q between the present and the year 2000. Thus, even if all of our energy requirements for the rest of this century are assumed to come from fluid fuels, we will still have about two-thirds of our economically recoverable reserves of fossil fuels left in the year 2000. This could increase to about 75 per cent if we include coal recoverable at 1.25 to 1.5 times present prices.

The assumption that all of our fossil fuels will be converted to fluid fuels is made to simplify the preceding analysis. However, it is not too unrealistic in view of the prominent role projected for fluid fuels—oil and gas—in meeting future energy demands. In 1958, fluid fuels supplied about 72 per cent of the U. S. energy demand and most projections indicate approximately the same percentage for the rest of this century.

It must not be inferred from the foregoing discussion that we can be complacent about our fossil fuel reserves. However, the indications just presented are much more favorable than earlier projections principally because of the enormous increase (twelvefold) in the estimates of energy recoverable from oil shale. Thus, in the immediate future, by which is meant the next half century, our fossil fuels could supply all of our energy requirements in the form of fluid fuels. Consequently, an adequate supply of raw material is available for conversion into gas. In the extremely long-range future we must look to other sources of fluid fuels; but before this, our planning should consider all possible methods for extending the life of our solid fossil fuels and for making the maximum quantity available for conversion to fluid fuels.

Nuclear Energy

Nuclear energy has emerged as an important partner to our fossil fuels in supplying future energy demands. Today it is known that efficient use of our fissionable uranium alone will yield energy equivalent to that contained in our economically recoverable reserves of fossil fuels. It has been estimated that the total United States' reserves of nuclear fuel may be as great as 1500 Q, which is about 400 times the U. S. energy requirement to the end of the century. The magnitude of the reserves of nuclear energy is so great that we can look to nuclear energy for supplying an increasingly significant fraction of our energy requirements in the extremely long-range future. In the interim, any use of nuclear energy will extend the life of our fossil fuel reserves. A recent projection indicates that nuclear energy may be supplying about 9 percent of the U. S. energy consumption by 1980.

MEETING THE DEMAND FOR GAS Projections of Gas Demand

The future demand for natural gas has been projected by various groups—some concerned with the overall energy problem and others concerned with particular aspects of the problem. In all instances projections of gas demand take into consideration the competition between gas and other fuels. The result of these projections are summarized in Table 3 and show annual growth rates

ranging from 4.1 to 4.4 per cent for the short range projections (10 years or less), and from 2.3 to 3.5 per cent for the longer range projections. Generally speaking, it would appear that the demand for gas will follow closely the demand for total energy. Estimates of Future Gas Discoveries and Deliverability.

In connection with projections of the future demand for gas it is important, in long-range planning, to examine estimates of the ultimate reserves of natural gas and more particularly "guesstimates" yielding projections of future deliverability may be used as a guide in approximating the period in the future when supplemental gas, either as imports or as gas made from coal or oil shale, will be required to satisfy the demand. It should be emphasized that comparisons made for the U. S. as a whole are useful only as a gross overall guide. Conditions will be different for each region or local area, so that conclusions drawn from a comparison of projected U. S. demand and deliverability will be applicable to some, but not necessarily all, regions.

The most recent estimates of the remaining reserves of natural gas (proved reserves plus future discoveries) range from 1200 to 1550 trillion cubic feet. These estimates are based on ultimate oil reserves of 250 to 300 billion barrels and on a gas-oil ratio of 7000 cubic feet per barrel. In the case of 250 billion barrels ultimate oil reserves the estimate would be as follows:

Estimated ultimate oil reserves, billion bbl	250
Cumulated production plus proved reserves through 1958, billion bbl	90
Future oil discoveries, billion bbl	160
Future natural gas discoveries assuming 7000 cu ft gas per bbl of oil, trillion cu ft	1120
Proved reserves, end of 1958, trillion cu ft	+ 254
Remaining reserves, trillion cu ft	1374

The calculation illustrated gives a result slightly greater than the recent estimate of 1200 trillion cu ft made by the Chase Manhattan Bank, who used a gas-oil ratio of 6000 cubic feet per barrel.

Table 3—Projections of the Demand for Gas
Base Projection, Trillion cubic feet

Projector	Reference	Year	Value, trillion cu. ft.	1965	1967	1970	1975	1980	2000	Annual growth rate, %
PMPC	6	1950	6.3				15			3.0
McKinney Panel	2	1954	8.7					21		3.5
NPA	4	1955	10.1					18		2.3
Parson	10	1955	10.1						36.6	2.9
Coqueron et al.	11	1957	11.5							4.1
Melnick	8	1958	11.5	14.6	17.2					4.4
Davis & Schweizer	9	1958	11.5			16.8				3.2

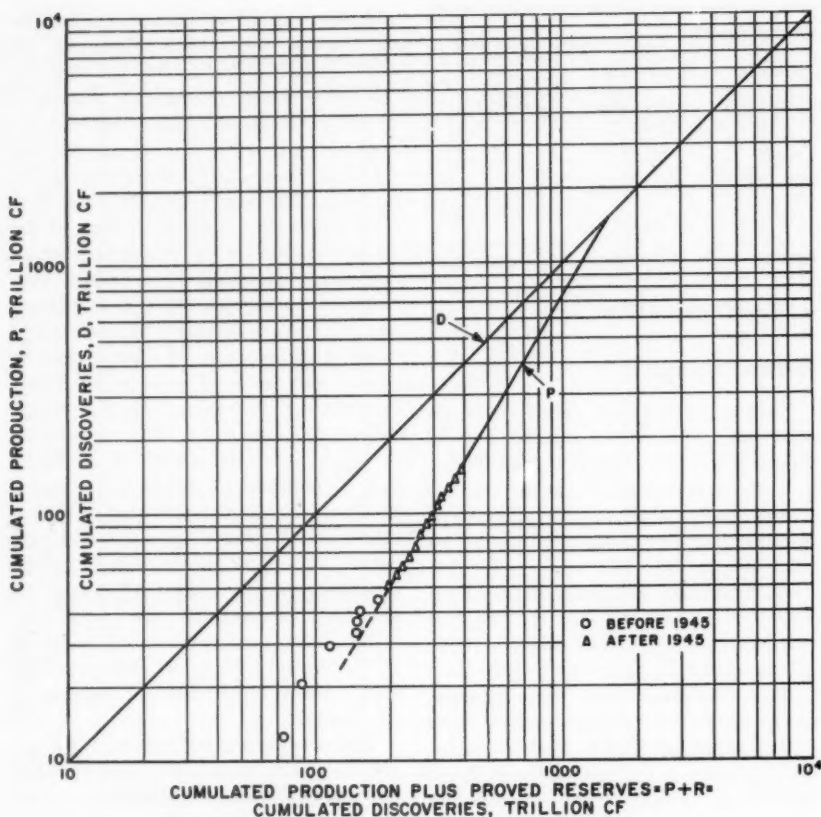


Fig. 3. Relation between cumulated production and cumulated discoveries.

When an estimate of remaining reserves of natural gas has been made, it is possible to approximate the future rate of production or deliverability by combining personal judgment with projections of demand. Personal judgment enters in selecting a value of peak production and in selecting a production curve so that the area under the curve showing yearly rate of production as a function of time is equal to the remaining reserves.

In an attempt to eliminate personal judgment as a factor in projecting future deliverability curves, a rational mathematical method has been developed at the Institute of Gas Technology. One of the relationships necessary in applying this method is shown in Fig. 3, in which cumulated production is plotted as a function of cumulated discoveries on logarithmic coordinates. It will be observed that with this type of plot the relation is linear for the past 12 years and thus furnishes a rational basis for extrapolation. When cumulated production equals cumulated discoveries we have reached the ultimate reserve. This is

shown by the intersection of the extrapolated line with a 45° line on Fig. 3. The second relationship required is shown in Fig. 4, which is a plot of the

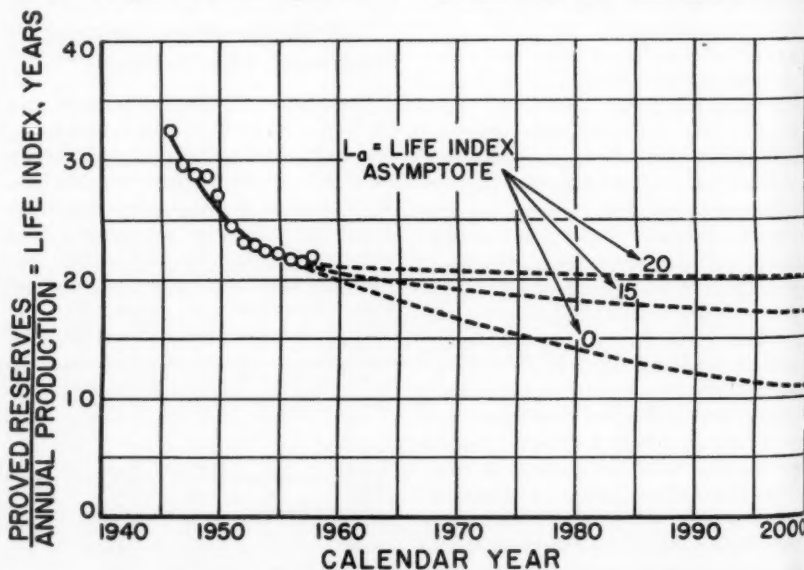


Fig. 4. Life index as a function of time with different assumed projections.

ratio of proved reserves to yearly production or life index as a function of time. In extrapolating this relation it may be assumed that the life index will approach certain selected values in the far distant future (values of 20, 15 and zero years are illustrated).

The relations shown in Figs. 3 and 4 may be expressed as equations. Using these equations it is possible to calculate yearly production as a function of time. Thus, it is possible to derive the projected deliverability curve analytically. It should be recognized that in this method of projecting deliverability, it is implicitly assumed that the demand will always be equal to or greater than deliverability.

It should not be inferred from the foregoing that this analytical method will yield accurate forecasts of the future rate of production. Instead, it offers a consistent method for examining the relative effect of different assumptions on the future rate of production. For example, Fig. 5 shows that the effect of assuming different values for the magnitude of the remaining reserves. An additional assumption in Fig. 5 is that the life index will never be less than 15 years. Under these conditions the projected peak production would be about 16.5 trillion cu ft per year and would occur in 1980 for an ultimate reserve of 1500 trillion cu ft. If the ultimate reserves were 2500 trillion cu ft, the peak production would be about 22 trillion cu ft and would occur between

2. Hydrogenation of the pretreated coal at a temperature of 1300° to 1400°F in a fluidized bed at pressures ranging from 1000 to 1500 psia.

Pretreatment is not required in hydrogasifying oil shale. Furthermore, high-Btu gas is the sole product of hydrogasification of oil shale. Thus, this process differs significantly from other processes for treating oil shale in which shale oil is the primary product. Coal has been hydrogasified successfully in a small continuous pilot plant at the Institute of Gas Technology. Information being obtained from this plant will furnish the basis for process design and eventually economic studies. The feasibility of hydrogasifying oil shale has been demonstrated in batch reactors, and a small pilot plant is now being constructed.

From the foregoing it is evident that the gas industry's research program on the production of high-Btu gas from coal and oil shale is well underway, with the methanation process already at an advanced stage of development and with the hydrogasification processes in the early and intermediate developmental stages. However, it should be clearly recognized that process development takes time and, although we have adequate lead time, it is not excessive considering that we are just in the pilot plant stage and that full-scale proved plants may be required in the 1970's.

The question everyone wants to have answered is "What is the cost of synthetic natural gas?" At present, only an approximate answer can be given, even though considerable effort has been expended on making detailed cost estimates by several organizations. The Gas Operations Research Committee of the American Gas Association reviewed estimates made by several groups and found the cost of high-Btu gas made by the methanation process to range from \$.80 to \$1.10 per 1000 cu ft of finished gas. Rough estimates indicate that coal hydrogasification costs may be less than \$.80 per 1000 cu ft and that cost of hydrogasifying oil shale may be in the range of \$.60 to \$.70 per 1000 cu ft. The uncertainties in cost estimates will not be resolved until a large-scale plant is erected and operated. Past history of comparable developments indicates that as operating experience and engineering know-how are accumulated, costs decrease. Inasmuch as the gas industry has adequate lead time in the development

of processes for making supplemental high-Btu gas it is reasonable to expect that when these processes are needed they will be able to furnish supplemental gas economically.

Before leaving the discussion of processes for producing supplemental gas it should be mentioned that the U.S. Bureau of Mines and the Atomic Energy Commission are cooperating in a study of the use of nuclear energy to supply the heat required for gasifying coal with steam. In the nuclear plant, helium is used in a closed cycle as a heat transfer medium to prevent the gas and residue from becoming radioactive. The nuclear plant eliminates the use of costly oxygen and also the coal required for steam and power production. The Bureau of Mines estimates that high-Btu gas could be produced in a nuclear plant at a cost 20 per cent less than in a plant using oxygen. This development will be actively followed by the gas industry, looking toward the day when nuclear energy could become a helpful partner in the production of supplemental gas.

It is beyond the scope of this discussion to consider the extremely long-range future when solar energy may be used. Nevertheless, we should recognize that the gas industry, with its ability to store energy and to transmit it economically, could play an important role in any future large scale indirect utilization of solar energy.

NUCLEAR ENERGY AS A COMPETITOR OF GAS

Nuclear energy has been singled out for consideration as a potential competitor of gas because we are on the threshold of an era in which nuclear energy will eventually supply a significant portion of the total energy demand. This emphasis on the competitive aspects of nuclear energy should not be construed as minimizing the importance of other sources of energy in competition with gas today. However, we have known for some time what this competition is and, in fact, the effect of this competition has been considered in most of the projections of the future demand for gas. But it is only recently that definitive studies have been made of the competitive entry of nuclear energy into the U.S. fuel economy. It is of interest, therefore, to review the results of these studies as they relate to gas.

The National Planning Association

has considered the competition between gas and nuclear energy in the generation of electric power and also as a source of industrial heat. It is estimated that in 1980 nuclear energy will replace 266 billion cu ft of gas per year in the generation of electric power, and 272 billion cu ft of gas in the generation of industrial heat. This represents a loss to nuclear energy of 3 per cent of the 1980 estimated marketed production of 18 trillion cu ft. This loss is certainly not significant in relation to overall gas industry operations.

In the long-range future, when nuclear energy may be used extensively for power generation, gas competing with electricity would be competing indirectly with nuclear energy. It is of interest, therefore, to consider a period in which gas produced from solid fossil fuels using nuclear heat would compete with electricity produced in nuclear plants and used in a heat pump for space heating. In a recent analysis of the problem it was assumed that the selling price of electricity would range for 1.0 to 1.5 cents per kwh, and that the selling price of gas produced from solid fossil fuels would range for 12 to 15 cents per therm. The results of this analysis are presented in Fig. 6, which shows that the minimum price projected for electricity (1.0 cents per kwh) would not be competitive with the maximum price projected for gas (15 cents per therm) at a heat pump coefficient of performance (C.O.P.) less than about 2.1. Since the heat pump will have a C.O.P. of less than 2.1 in a region of the United States occupied by 50 per cent of the population, it is evident that electricity would not be competitive for this large fraction of the market. In contrast, gas can compete with electricity at coefficients of performance greater than 2.1, as indicated by the shaded area in Fig. 6, the competitive price of the two fuels being given along any line of constant C.O.P. From the foregoing, it is apparent that gas will continue to maintain a strong competitive position in the space-heating market.

SUMMARY

From this general review of the overall energy problem with particular reference to energy in the form of gaseous fuel, it is evident that gas will continue to play an important role in helping to meet future demands for energy. No

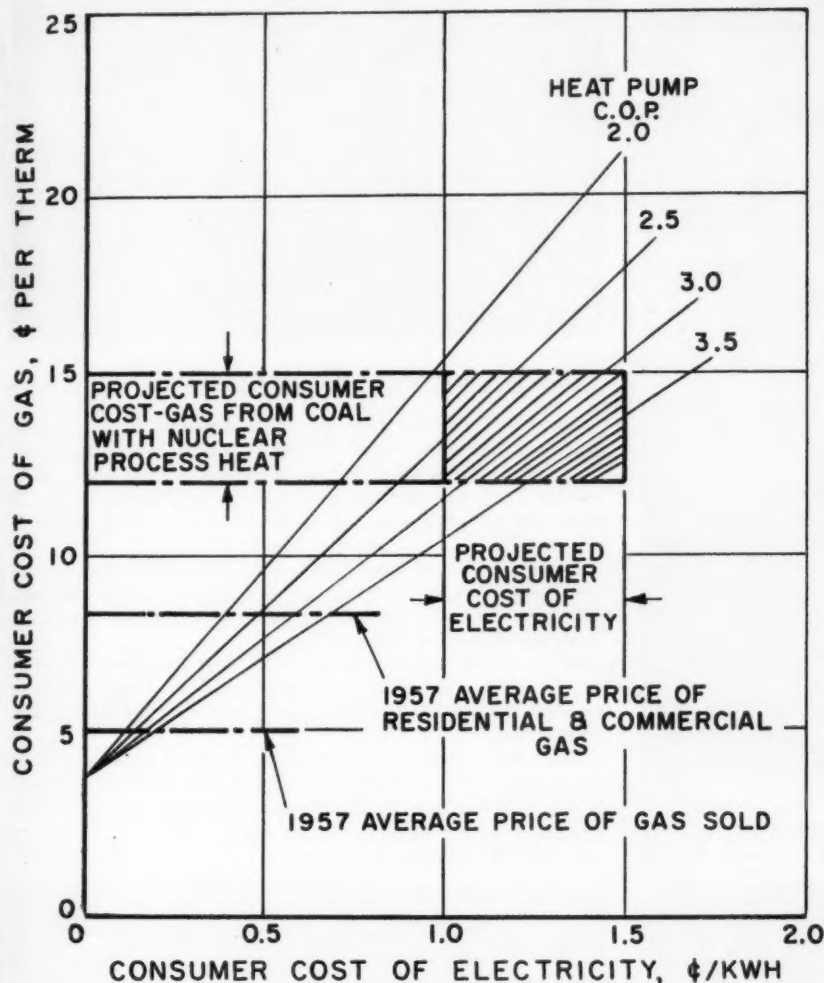


Fig. 6. Relation between consumer costs of gas and electricity for equal yearly cost of space heating with a yearly heat requirement of 1200 therms.

cessation in the progressive increase in the demand for energy is foreseen far into the future, because energy is a key ingredient in our expanding economy and industrial technology. In fact, in the rest of this century we will consume almost three times as much energy as we did from 1800 to the present. In spite of this intensive use of energy we will still have about two-thirds of our economically recoverable reserves of fossil fuels left in the year 2000.

For the remainder of this century, the major portion of the energy demand, in the range of 65 to 75 per cent, will be supplied by the fluid fuels—oil and gas. Estimates of the fraction of the total energy demand to be supplied by gas range from 25 to 35 per cent. Annual growth rates in the projected demand for gas are about 4 per cent for the next

10 years, and nearly 3 per cent for the remainder of the century. Since the projected annual growth rate in total energy demand is slightly less than 3 per cent, it is clear that gas will maintain its competitive position and continue to be one of the major suppliers of energy.

Eventually supplemental gas will be required to meet the projected demand for gas in some regions of the country. An overall analysis of the relation between probable future rate of production and projected demand indicates that supplemental gas may be required sometime in the period 1975 to 1985. We now know that imported liquefied natural gas can be used as a source of supplemental gas. For longer-range sources we must look to gasification of our solid fossil fuels—coal and oil shale. Such gasification processes are under development as

a part of the gas industry's long-range research program. With the lead time available and with a continuing program, we can expect that the technology for producing high-Btu gas economically from coal and oil shale will be available when needed.

In recent years nuclear energy has emerged both as a partner and as a competitor in supplying energy. As a partner it will help extend the life of our fossil fuels, and in the case of the gas industry it is available as a source of heat for gasification processes. As a direct competitor it will capture only an insignificant fraction of the gas market in the next 20 years. Even in the long-range future, gas produced from fossil fuels is in an excellent position to supply the bulk of the space-heating market in competition with electricity generated in nuclear plants.

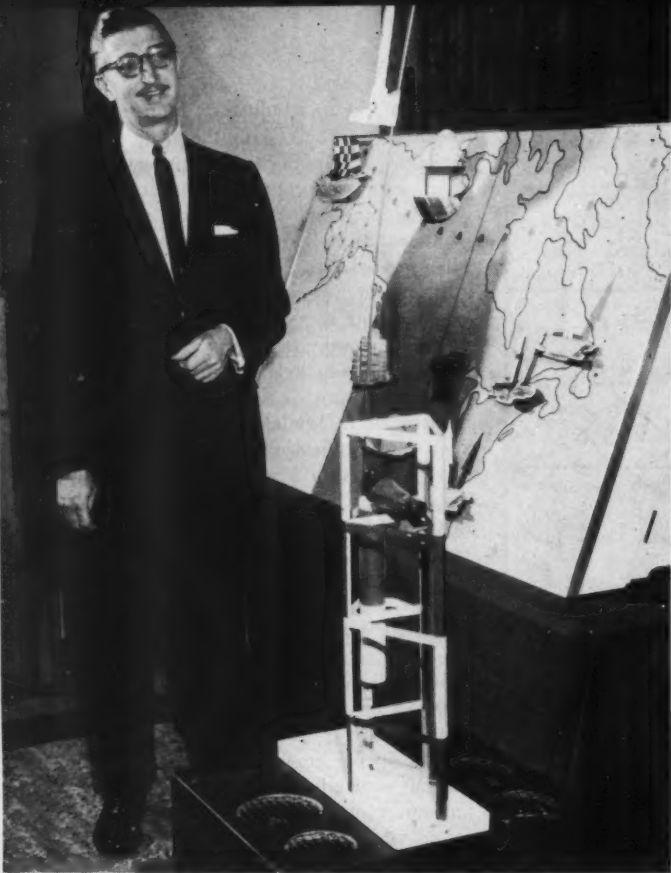
With the inherent advantages of gas, with the growing demand for gas, with assurance of a long-range supply and with a strong competitive position, we can but conclude that gas is destined for an important role in supplying the energy so vital to the continued growth of our economy and to our individual economic well-being.

Generator Contract

Combustion Engineering has been awarded a contract by Commonwealth Edison Company, Chicago, for a steam generating unit to be built at Will County Station near Lemont. This unit will serve as a 510,000-kilowatt turbine generator and will be the first unit of this capacity to be purchased by a privately-owned utility company. Rising to the height of a 20-story building this giant will generate 3,900,000 pounds of steam per hour (equivalent to evaporating more than 8,000 gallons of water each minute) at a pressure of 2500 pounds per sq. in. and a temperature of 1000 degrees F. This steam will produce half a million kilowatts of electric power for the Chicago area's rapidly expanding requirement for electricity.

Shipments from Combustion's Chattanooga and East Chicago Divisions to the plant site, five miles north of Joliet, Illinois is scheduled to start in July, 1961.

Sargent & Lundy are consulting engineers for the installation which is scheduled to start commercial operation in 1963.



Above, Howard Bamman of Illinois Bell stands by equipment for his talk, "Weapons for Defense." Presentation included conversation with Air Force Defense Center in Colorado Springs.



New Members' Dinner

Something unusual took place at Western Society Headquarters on April 18—a New Members' Dinner. Lauren Asplundh, Illinois Bell Telephone Company engineer who is WSE Membership Chairman and the guiding spirit behind the Dinner, is shown at the left in the picture directly above, with Albert P. Boysen.

In the picture just below, Dr. John T. Rettaliata, President of the Western Society of Engineers and Illinois Institute of Technology, tells the new members, sponsors, and others in the dinner audience, about the Western Society.

Below in the bottom picture, WSE Past President Albert P. Boysen gives some good and useful advice to new members on what they can do for the Society, and what the Society can do for them.

The small picture to the left shows Program Chairman H. R. Heckendorn (left) and First Vice President R. D. Maxson (right) talking with new member M. W. Lane. The picture at the bottom left, shows new members John W. Jessup (left), Ralph Barrows, and Clarence Kolzow.



Applications

Tapas Kumer Roy, 5134 S. Woodlawn Ave., attending the Chicago Technical College.

Howard R. Levin, Planning Engineer, Western Electric Co., Inc., Hawthorne Station.

Raymond F. Kirchoff, Electrical Engineer, Western Electric Co., Inc., Hawthorne Station.

W. J. Hauger, Equip. Engrg. Dept. Chief, Western Electric Co., Inc., Hawthorne Station.

Louis F. Mahoney, Equipment Engineer, Western Electric Co., Inc., Hawthorne Station.

Walter N. Hanamoto, Struct'l. Draftsman, Naess & Murphy, 224 S. Michigan Ave.

William A. Romain, Executive Vice Pres., Industrial Enterprises, Inc., 9705 Cottage Grove Ave.

Casimir J. Bonkowski, Engrg. Associate, Western Electric Co., Inc., Hawthorne Station.

Marvin W. Wilson, Civil Engr.-Estimator, A. L. Jackson Co., 300 W. Washington St.

Stanley A. Schack, Field Metallurgist, American Smelting & Refining Co., Whiting, Ind.

Daniel M. Zinn, President & Gen. Mgr., Springbrook Motors, Inc., 1417 W. Lake St., Aurora, Ill.

Rudolph E. Kiesel, Development Engr., Western Electric Co., Inc., Hawthorne Station.

K. E. Schroeder, Assist. Supt., Mfg. Engrg., Western Electric Co., Inc., Hawthorne Station.

R. E. Graham, Field Engr., Elect.; Fischback, Moore & Morrissey, 173 W. Madison St.

Basil S. Burrell, Director of Research, American Hospital Supply Corp., 2020 Ridge Ave., Evanston, Ill.

Roy M. Onischak, Production Engineer, General Electric Co., Hotpoint Div., 14th & Arnold Sts., Chicago Heights.

Severin Caitung, President, Wabash Power Equipment Co., 64 Old Orchard, Skokie, Ill.

Herbert E. Fritschel, Dept. Chief-Plant Engrg., Western Electric Co., Inc.

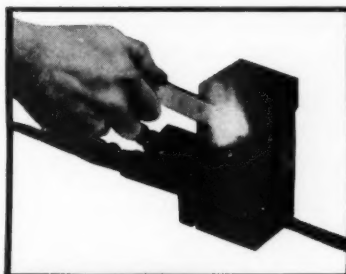
Ronald W. Schalk, Plan'g. Standards Engr., Western Electric Co., Inc., Hawthorne Station.

MIDWEST ENGINEER

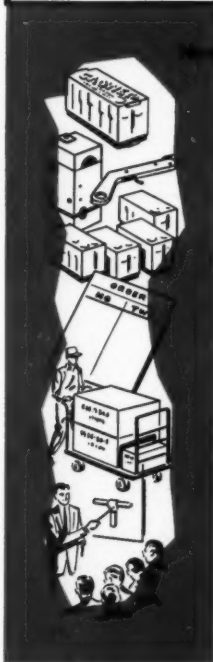
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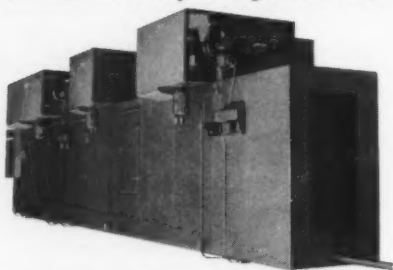
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Monorail Units

Monorail and other types of conveyorized, standardized, stage-by-stage power spray washing and phosphatizing units, a totally new concept in this type of equipment, developed by Ramco Equipment Corporation, New York, provide unusual flexibility for present and long-range requirements for a complete finishing program. Ramco, a division of Randall Manufacturing Company, also manufactures vapor degreasers, flow-



coat and automatic paint dipping machines, bake ovens, spray booths, electroplating and anodizing equipment.

The Ramco designed, pre-engineered power spray washing and phosphatizing modules (sections) permit adding or modifying process stages economically as finishing requirements change. These standardized units eliminate time-consuming and costly custom designing, engineering and manufacturing of equipment to individual specifications. Ramco has designed five silhouette work groups of conveyorized monorail washing machines, with six chemical process time cycles in each silhouette work group. Based on the size of the work, number of finishing stages required and hourly production requirements, the proper units can be selected utilizing the fill-in process in production formula in Ramco's illustrated brochure.

Designed and manufactured to give long, maintenance-free service, Ramco uses heavy duty, vertical, packless pumps with all plumbing headers internal to prevent external leakage and motor damage. Because of the compact design, enlarged spray manifolds and minimum piping, less pressure is required to operate pumps. Nozzle pressure is exactly set and accurately controlled by a throttling valve on the pump discharge. Two pres-

sure gauges, one at the spray nozzle, the other at the pump's main discharge line, provide constant accurate pressure checks.

Seal-tight covers keep vapors and fumes from escaping and are easily removed for cleaning out sludge. A double screening filter system prevents sludge and other foreign substances from being drawn into the pump. The staggered spraying system utilizes veejet nozzles for high velocity impingement, with a minimum splashing in the drain areas. Both steam heated and gas fired machines are available. Ramco's engineering department will engineer specialized equipment for individual customer's requirements.

Detailed bulletin and complete information available from Ramco Equipment Corporation, a division of Randall Manufacturing Company, Inc., 1379 Lafayette Ave., New York 59.

Footswitch

The new Cat. #90 Rheostat Footswitch has been added to the complete line available from America's Footswitch Leader, the Linemaster Switch Corporation. Depressing the Cat. #90 allows operators of variable speed equip-

ment to change speeds, while both hands are left free to work.

Designed primarily for operation by users in a seated position, the new Rheostat Footswitch stays cool under all operating conditions. The rugged variable resistor has a maximum resistance of 350 ohms, with the unit rated at 0.8 amps at 125v AC or DC. The durable phenolic housing assures long, trouble-free service, while the rubber feet on the base give positive skid-prevention.



This newest Linemaster Footswitch, available from stock for immediate delivery, is supplied with a 6-foot, 18/2 cord set, with molded-on-2-prong series plug for insertion into the driving unit.

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switch, available from Linemaster Switch Corp., 432 Woodstock Terrace, Woodstock, Conn.

Insutape

Insutape, a wrap-on asbestos insulation that is both flameproof and weatherproof, has been announced by Union Asbestos & Rubber Company, Fibrous Products Division, Bloomington, Illinois. It is designed for a wide variety of industrial applications requiring an easy-to-apply, economical insulating material.

This product is especially adaptable to insulating work under difficult application conditions—under close-clearance conditions, and for bent or curved instrument lines and pipe.

Since Insutape withstands ravages of weather, vibration, and intense heat, it provides permanent insulation and personnel protection, even under extreme conditions.

It can be removed and reapplied without loss of insulating efficiency, thereby reducing insulating costs.

Insutape consists of long-fibered asbestos rovings, completely enclosed in a tubular, woven asbestos jacket. The exposed surfaces and edges of the jacket are heavily coated with Neoprene. This tough, abrasion-resistant covering is essentially non-combustible and resists penetration of moisture, oil and grease.

A snug fit around the pipe is quickly achieved by working spiral wrappings with the hands and pressing tape edges firmly together to assure maximum conservation of heat. Wire bands or clamps used at intervals hold the Insutape firmly in place.

For additional information on Insutape, write Union Asbestos & Rubber Co., Fibrous Products Division, 1111 West Perry Street, Bloomington, Illinois.

Missile Silo "Sunk"

The contractor building two underground firing silos for Minuteman solid-propellant missile tests at Cape Canaveral, Fla., is literally "sinking" the 109-foot-deep silos into Canaveral's watery sand, states *Engineering News-Record*. Sections of the huge reinforced concrete structures are built at ground level. As the weight of each section sinks the silo into the ground, a new section is poured on top and the earth in the middle is excavated by a crane.

Attention: All Members Subject: Membership Drive

Are there engineers, architects, and designers in your organization who should belong to the Western Society of Engineers?

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Please request posters from the Western Society of Engineers at 84 E. Randolph street, Chicago 1, or by calling RAndolph 6-1736.



Your Membership Committee

Calendar of Chicago Engineering

May 18, Wed., WSE Noon Luncheon Meeting. "Heart Disease and Its Treatment." At 12:00 noon, WSE Hq.

May 24, Tues., WSE Annual Meeting and Ladies Night. Come and meet your new officers. Dorothy Bond, world's foremost woman cartoonist, will entertain. She's different. She's terrific! You can't afford to miss this evening! Social Hour, 5:15 p.m. Dinner, 6:30. Entertainment, about 8:00. Ladies more than wel-

come. At WSE Headquarters.

May 25, Wed., WSE Noon Luncheon Meeting. "Dresden Start-Up." At 12:00 noon, WSE Hq.

NOTE: Wednesday Noon Luncheon Meetings will continue all through the summer. **HINT:** for the prevention and sure cure for the summer doldrums, attend the Luncheon meeting every Wednesday.

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Reviews of Technical Books



Civil Engineering

Data Book for Civil Engineers, Volume One—Design, by Elwyn E. Seelye with special acknowledgment to Morton C. Simmons. Publisher, John Wiley and Sons, Incorporated, New York 16, New York. Pages, 650. Price \$24.00

This extensive reference work in the civil engineering field has been revised and its scope expanded. This has been accomplished in this 1960 edition and great care has been taken to make the data simple and usable, and to guide the user in their use.

In the treatment of this important subject the prime purpose of this data book was to furnish an engineer with sufficient data so that he could design any civil engineering work without other reference books. The volume is somewhat unique in engineering literature for it combines maximum data with a minimum explanation. Derivations and discussions have been largely eliminated as the notes on the plates give necessary guidance.

Numerous engineers have collaborated on this third edition to gather fundamental principles and procedures of all phases of civil engineering. A clarification of modern codes, practices and designs are included. Tables for prestressed concrete, limit design, composite beam construction, cathodic protection and AASHO road standards have been emphasized.

The book features such topics as plastic design of steel, structural aluminum, light weight concrete aggregates, wind pressures, concrete columns with eccentric loads, structural timber, highways, bridges, airports, water-front structures, drainage, sanitation, water supply and petroleum products handling.

W.L.R.

Cost Estimating

Estimating Construction Costs, by R. L. Peurifoy. Publisher, McGraw-Hill Book Company, Incorporated, New York 36, New York. Pages, 446. Price, \$10.75

A clearly written, practical volume for construction engineers, civil engineers and estimators, this book tells in detail how to estimate construction costs of all kinds and describes the various methods of preparing such estimates.

Unit costs are broken down into material, labor, equipment and profit. Numerous examples explain how to arrive at unit costs for a great number of construction items for a variety of projects. The book contains unusually comprehensive descriptions of the means for determining the production rates of both labor and equipment. The costs of many types of construction equipment are given as well as the hourly cost of owning and operating such equipment.

This revised and expanded edition contains up-to-date advances in cost estimating along with other topics of

special interest to the engineer and architect. The next includes one hundred useful tables on production rates and is well documented with a wealth of information on phases of construction usually difficult to obtain.

W.L.R.

Rigging

Handbook of Rigging, by W. E. Rossnagel, Safety Engineer, Consolidated Edison Company of New York, Inc., McGraw-Hill Book Company, Inc., 330 W. 42nd Street, New York 36, New York. Price, \$7.75

Mr. Rossnagel presents expert rigging methods and techniques which can be used in everyday maintenance operations, machinery handling, or demolition work. This book explains simple formulas useful in calculating the strength of hoisting tackle, beams, and posts. Also illustrated are designs for portable cranes and other material handling equipment. Other items covered are codes, laws and standards; loading heavy equipment for transportation; use of slings on loads to be rotated or inverted. Advances in safety belts, scaffolds, etc., using wire and manila rope; testing scaffold planks; using ladders safely; handling special rigging problems; giving emergency first aid; and many more.

Business Law

Business Law, Principles and Cases—by John W. Wyatt, University of Florida; Florida and Federal Bars; and Nadie B. Wyatt, Florida and Federal Bars; McGraw-Hill Book Company, Inc., 330 W. 42nd Street, New York 36, N. Y.

This book explains in practical understandable form the many laws which govern business transactions. More than 1,000 common business legal problems are given sound simple answers. In addition it covers contracts, negotiable instruments, government regulations, sales, partnerships, bankruptcy, trusts, corporations, and many more.

Business Law is a valuable guide for every businessman.

Mathematics

Mathematics for Science and Engineering, by Philip L. Alger. Published by General Electric Company, Inc., 330 W. 42nd Street, New York 36, N. Y.

Mathematics for Science and Engineering provides an excellent review or a basis for further study of mathematics. The volume includes: Arithmetic, Trigonometry, Directed Numbers, Algebraic Equations, Infinite Series, Maxima and Minima, Differential Equations, Probability, Mathematical Models, and Electric Circuits, and other subjects.

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POSITIONS AVAILABLE

C-7964 (A) INDUSTRIAL ENGRS. Grad. ME age to 40; 0-5 yrs. exper. in gen'l. engrg. i.e. methods, time study, costs, etc. Duties: Working in field travelling abt. 90% of time on methods, time studies, cost reduction, etc. within 40 mi. radius of Chgo. for a railroad. Can use recent grads & train. Must be U.S. citizen, home every night, car req'd. sal. \$6300/12,000 dep. on exper. & expenses for car & trav. employer will pay the fee.

C-8016 (A) SECT. MGR. INDUSTRIAL MAGNETIC RECORDING ME or EE age 32-45; 5 yrs. exper. design & devel. of magnetic recording devices for computer & instrumentation. Duties: Manage small section with resp. to design & devel. special purpose magnetic recording devices, tape heads, transports, etc. sal. open, loc. Chgo. area, employer will pay the fee.

C-8016 (C) DEVEL. ENGR. EE or equiv. age 30-45; 5 yrs. exper. circuit design preferably with FM tuner exper. knowl. of receivers & transmitters. Du-

ties: Sr. design & devel. of electronic devices sal. open loc. Chgo. Area, employer will pay the fee.

C-8028 SR. PROJECT ENGR. BSME or equiv. age 30-45; 5 yrs. exper. design & implementation of special purpose prod. tooling & eqpt. Thorough knowl. of fabrication processes incl. rolling, punching, breaking, slitting & welding. Alum. extrusion exper. helpful. Duties: Work with design & implementation of above for a mfr. of roof & deck steel, sal. \$9/10,000 loc. W. Chgo. Suburb, employer will negotiate the fee.

C-8032 SR. PROCESS ENGR. BSIE or equiv. age to 40; 3 yrs. exper. processing, cost estimating tooling, time & methods study; know fabrication & assembly operations. Duties: To take resp. for a product as far as cost, methods, for parts & assemblies, tooling & processing. Periodic supv. of processing & line set-up, for a mfr. of agriculture mach. sal. to \$7800 loc. Midwest, employer will negotiate the fee.

C-8037 DRAFTS. ARCH OR STRUCT.

2+ yrs. exper. on the board. Duties: Layout of floor plans for hospital facil. Follow thru & check on installation of eqpt. Might be able to use older man. Will turn over layout to arch., drafting dept. for completion sal. \$6/7500 loc. Chgo. employer might negotiate the fee. C-8045 SALES ENGR. Engrg. Degree 2+ yrs. exper. operation or design of water & waste treatment eqpt. Know water treatment or Ion exchange or inorganic waste treatment such as plating. Duties: Engineer a treatment system, based upon customer's inquiry, using standard eqpt., write sales letter to customer, with quotation on eqpt. applied sal \$9/10,000 loc. S.W. Chgo. suburb, employer will negotiate the fee.

C-8051 FIELD ENGR. ME, CE or EE training age abt. 30; know bldg. trades, carpentry, elect. & construction. Duties: To assist in layout & construction of trailer parks. Some exper. in the field on sanitary problems gas & elect. facilities. Prefer single man because of amount of travel for a trade assoc. sal. \$7/8500 loc. Chgo. Hdqrs., employer will pay the fee.

C-8054 (A) ASST. TO FACTORY MANAGER Grad. Chem. E. or Chemist age to 45; 2+ yrs. exper. with rubber or elastomers in supv. capacity; knowl. of costs & internal control desirable. Duties: All production incl. cost & mfg. quality (ultimately incl. scheduling). Must have ability to assume manager resp. in 6 mos. Must be able to work with sales personnel & customers on service. Should be willing to relocate for a mfr. of printers rollers sal. \$8500/10,000 loc. Chgo., employer will pay the fee.

ENGINEERS AVAILABLE

1085-MW: GENERAL MANAGER OR SALES 42; Organized assembly & sales electronic components 11 states 2 yrs. sales engrg. Induction heating. 4 yrs. process engr. aircraft engines. 13 yrs. field engrg. industrial electronics. OEM following Midwest pref.

1084-MW: ELECTRIC POWER ENGR. BSEE 33; 11 yrs. exper. in the design & operation of rural & urban power distribution & transmission. Technical as well as supv. exper. Hold professional license. Midwest & West.

1077-MW: TRADE ASSOC. DIR. CONSULTANT OR PROJECT MGMT. BSCE 50; Engrg. consultant over 15 yrs. on construction, research, editorial, promotion & code work. In addition over 10 years experience in the actual supervision of work in the building industry. U.S.

1070-MW: CIVIL ENGR. BSCE 26; traffic research 3 mos. Detailing 6 mos. I am a recent graduate interested in part outdoors work. Have some exper. in sales. Have. supv. men & projects.

C-8055 INSPECTOR OF CONSTRUCTION GRAD. CE preferred 3+ yrs. exper. in concrete inspection on dam & flood control projects. Will work swing shift. To check & see that work is completed according to specifications. 2 yr. contract in Iran; housing available at abt. \$75 per mo., for a consultant sal. \$9,000 base U.S.A. + 50% for overseas duty, employer will pay the fee.

C-8064 INDUSTRIAL ENGR. IE Grad. or equiv. age to 35; 3+ yrs. exper. in gen'l. industrial engrg. Duties: To study motor terminal dock operations—incl. time study, methods, layout, cost analysis, etc. Good mgmt. potential. Not necessary to have had exper. on terminal or freight operations sal. may go to \$9600 Chgo. Hdqr.

C-8065 ASST. DIRECTOR OF PUBLIC WORKS GRAD. CE 3+ yrs. exper. in street & highway works. Duties: Asst. director of public works resp. for street & municipal maint. & const. sal. \$7400/

8970 loc. No. Shore Chgo. Suburb, employer will pay the fee.

C-7954 OFFICE & FIELD ENGR. Grad. CE 2+ yrs. exper. in field & office engrg. Duties: To start with will work in the office on est. & planning, later in the field for contractor engaged in road work, pipe line construction & outside elect. construction sal. \$125 wk. loc. No. Shore Suburb, employer will pay the fee.

C-7955 SPECIFICATION WRITER

Grad. Engr. age to 55; 5+ yrs. exper. in heavy construction projects for a consultant sal. up to \$10,000 loc. Chgo., employer will pay the fee.

High Pressure Tool

Ultra high pressures—several thousand atmospheres—may be a “new tool in materials research and synthesis,” it was reported in Atlanta on Feb. 23 at the 42nd National Meeting of the American Institute of Chemical Engineers.

“It is evident from the accomplishments to date that ultrahigh pressure should become an important tool in synthesis of new materials by promoting transformations and reactions in solids,” C. M. Schwartz, Battelle Memorial Institute, Columbus, O., reported in a paper, “Ultra-high Pressure—a New Tool for Chemical Synthesis.”

“As the pressure and temperature capabilities of the apparatus are improved there is little doubt that new materials having unique properties will be synthesized. Under these conditions the new products should possess higher density, hardness or excitation resistance. Obviously, therefore, we may hope for improved abrasives and refractories. There also is the possibility of development of new and exotic compounds or compositions for use as nuclear reactor fuels. In the field of organic, as well as inorganic, chemistry, the potentials are equally promising.

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Civic Committee Features Hedden

All good planning must be based on good research. I would say that city planning is 90 per cent research and 10 per cent inspiration.

Part of this research in studying a program for any community must concern itself with the financial base of the city. After all, the provision of jobs is what makes a community tick.

Except for pensioner communities, all other cities are in a competitive situation relative to one another. In many respects, it is what man has done to the natural advantages of a location which determines the relative position of a city in its status with competing municipalities. In this respect, nothing is static. There is a continual pressure from economic, social, and political forces establishing trends and programs to enhance or deter the community in the race to achieve its destiny.

I would like to examine a few of these forces and indicate the advantages that can be taken to enhance the general environment for industry in this area.

In Lewis Carroll's *Alice in Wonderland*, the Red Queen counsels Alice "to stay in one place, you have to do all the running you can. If you want to get anywhere, you have to run twice as fast." This characterizes our position. The problem which then presents itself is, "In what direction?"

The Hard Fact

It is unfortunate but we must face the hard fact that Chicago may lose its position as the second city in the nation next year. Somewhere along the line, despite all our gains, someone was running faster.

A preliminary report by Victor R. Fuchs, assistant professor of economics at Columbia University, on changes in the location of manufacturing in the United States, indicated that between 1929-1954, the relative growth of all manufacturing in Illinois was off 13 per cent in value added and off 12.8 per cent in total employment. During the dynamic period of expansion from 1947 to 1954, the comparable figures are: value added by manufacture, off 6.8 per cent and total employment, off 7 per cent.

Paul van T. Hedden, well-known city planner and chairman of the Planning Subcommittee of the Western Society's Civic Committee, spoke before the Committee on February 17, 1960. Here are excerpts of his talk about the future industrial climate in Chicago.

These figures to be acceptable deserve some explanation. In the first place, the study was confined to only areal changes. It is confined to relative changes based upon differentials in rates of growth of each industry in the state and nationally. Thus, if the state figure was less than that which would have resulted in the state had it grown at the national rate, the figure is a negative one. If the figure is higher, the result then becomes posi-

tive. To balance the industrial structure of each state, i.e., whether the industries in each, as a group, grew faster or slower than the level of national manufacturing in general, the 1929 components were compared with the 1954.

Until the completed study is published, specific industry patterns will not be available, nor will many corollary findings regarding the movements be subject to study. But it is possible to specu-

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late on some of the patterns revealed. The areas of the nation which were low on the industrial and population totem poles have proven attractive for plants moving close to raw material sources, for branch plants to serve an increasing market, and for new industries which had their uncertain origins in relatively low cost spots where they received encouragement.

The community advantages were often numerous; pleasing environment, relatively low cost of living index, adequate transportation facilities, a dedicated approach to solution of growing pains through sound planning and zoning practices.

Chicago Keeps Advantages

Chicago has lost none of its advantages. I don't have to enumerate them for you. Further, you are knowledgeable in what is being done to improve certain community factors, and the vast sums of money, both public and private, being spent to that end.

A recently completed study of the impact of the St. Lawrence Seaway on this region indicates the areas of industrial growth, stability, and decline. Close attention should be given to the growth list. In it is the key to the demand for land for future industrial use. A great deal has been written about the availability of industrial land in the Chicago area, but a detailed analysis of it indicates that little attention has been given to the location of combinations of industrial activities which are interrelated because of production, technical or marketing cohesion.

Those plants which collectively manufacture a single complete product, or intermediate products, or which from the same raw or semi-finished materials produce different end products must be analyzed as a whole in order to determine the most efficient land use pattern capable of lowering costs, simplifying and minimizing transportation problems, sharing a common labor pool and problems, and strengthening the market for the joint products.

Such a study would indicate the necessity of reserving land for specific industrial complexes in the areas best suited for their development. At the present time, most available industrial areas of any size are limited to a certain specific zoning classification based upon

performance characteristics regardless of the economic relationship of industries with diverse characteristics. The inevitable result is that all are subject to the limitations of the heaviest operation. Another factor is the tendency of owners of large acreage to sell it indiscriminately on the "First come, first served" basis. The keyed or related industry is given scant if any attention, yet the knowledgeable seller has an exclusive market for the remainder of a group if any one of them makes a purchase.

Both private and public policy must operate to reserve land for these related industrial operations. Today no such policy exists. Based upon sound research,

an attractive program and joint policy can be generated to encourage the expansion of industrial complexes in Chicago.

In the reservation of industrial land for specific uses, your attention is called to the dearth of deep water frontage in Chicago, west of the Indiana-Illinois state line. I refer not to transportation concentration which is called a port, but to areas suitable for an industry which requires its own private dock and wharf space.

The east coast, from Virginia to Massachusetts, finds itself short of deep water sites. A major portion of industry seeking such accommodation could profitably use a Chicago location. Yet the

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amount of land available for this use is severely limited. About the only sizeable concentration is to be found at Lake Calumet, and that is not ready for immediate occupancy.

It is essential that study and thought be given to this problem to develop a far-reaching program that will bring into being a reserve of deep water industrial land for future use. Other communities, not so well located and without the other resources of Chicago, may take precedence if they can offer such sites with immediate availability.

Housing, Transportation

There are two more topics that deserve your attention. They are housing and metropolitan mass transportation. Both have a distinct bearing on the problem of industrial location in the Chicago area. Both are of importance to private industry, employees, and government. Neither is about to be solved presently. Yet the situations are causing anxiety and are directly attributable, in some cases, for suburban, rather than central city, location for industries.

For example, only a couple of years ago, a Chicago manufacturer sought to consolidate his plant which had mushroomed through adjacent buildings. Practically, he could move anywhere in the metropolitan area. Actually, the move was dictated by the residential location of employees who had changed residences over the past ten years. These employees had left the central city and moved westward. The plant followed them and is now successfully located in a western suburb. The move can be attributed to a better living environment in the metropolitan ring.

Here is at least one instance that can be documented where housing influenced industrial location. It can be multiplied.

Present trends indicate that the great American middle class is expanding and leaving the central city. They are leaving vast in-town areas to the very rich and the very poor. Efforts to provide them with housing in an attractive environment have been sporadic and unsuccessful. The great hope for the central city in this area lies in urban renewal. This program must be reorganized and speeded up to meet the challenge posed by industrial expansion. It must provide greater opportunity for

the private enterprise building industry to rehabilitate existing residential structures and erect new ones while government spends public funds on improving the environment.

If you are employed in the central city, an economist will tell you that it is cheaper and more convenient to live in the central city, and the psychologist will tell you it is less frustrating. There is no program, however, to ballyhoo the advantages of central city living the way the system is rigged for suburban development. Have you ever seen a sign advising "Live close to work, amusements, and the cultural advantages of a great city for less money, less travel time, and less chore time and effort?"

The central city must publicize its advantages to its own citizens to offset the disillusioning trek to the oftentimes disappointing green pastures. Many who make the move fail to realize the urban amenities of Chicago and to assess correctly the status of urbanization in the burgeoning suburb. Neither do they estimate the high cost of turning the prairie into a well-balanced community.

It is partly the responsibility of industry to assure itself that the living environment of its employees is relatively as attractive as the working environment of the plant. Enlightened industrial management is examining in greater detail than ever before the school system, neighborhood amenities, and the extent

and quality of government services. More industrialists are represented on local planning commissions. It is all reflected in the acceptance that the industrial community is not an island unto itself.

The problem of mass transportation in metropolitan Chicago can no longer be left to the C.T.A. and commuter railroads for solution. The situation has forced industry to invest in large areas of high value land just to accommodate the private transportation of employees. In many cases these parking lots are used less than one third of the time. Yet they are expensive to construct and maintain.

The Automobile

The automobile has become a point of personal privilege with people. Yet the auto is an uneconomic and slow method of transportation on congested urban streets. A coordinated mass transit system geared to the demands of the movement patterns of people and related to land use development is an absolute essential for the life blood of the Chicago area.

All rapid transit today is loop oriented. The interconnections between rapid and surface transit are not designed to promote travel throughout the metropolitan area. The mobility of our citizens requires that they be allowed to go from any point in the area to any

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other point, quicker, easier, and cheaper than an automobile can cover the distance.

We can't afford to let valuable, irreplaceable rights-of-way like the Aurora Elgin and the North Shore be abandoned. These properties must be preserved for the public convenience and necessity.

The encouragement of the auto-rapid transit pattern is good. It is already the pattern for commuters but must be adopted by outlying central city people as well. Valuable information will be forthcoming from the Chicago area transportation survey. But this will require implementation by a detailed study

of the present rail-transport systems and development of proposals for their coordination into a single effective system.

Your attention is called to a report of the Chicago Plan Commission dated December, 1956, entitled "The Calumet Area of Metropolitan Chicago." Therein the problems I have discussed today were given detailed treatment. In the intervening three years, scant attention has been paid to them as they affect the City of Chicago as distinguished from the metropolitan ring. The research required to understand the interrelationships involved is long term.

We must run "twice as fast" to achieve our industrial goals.

Russia Lags in Electric Power

Russia is far behind the United States in the production of electric power and the gap will widen by 1965, the nation's electrical engineers were told in New York on Feb. 1.

"The latest Russian Seven Year Plan calls for installation of some 60 million kilowatts of capacity between 1959 and 1965, bringing Russia's total then to about 113 million kilowatts," Charles E. Eble, president of Consolidated Edison Company, New York, said in an address at the opening general session of the five-day Winter General Meeting of the American Institute of Electrical Engineers in the Statler Hilton Hotel.

"According to reliable forecasts, we will have 250 million kilowatts by 1965. Thus the gap between the United States and Russia power capacities which was 107 million kilowatts in 1958 will have increased to about 137 million by 1965."

Mr. Eble was one of the group of utility executives who toured Siberian electric installations last Summer under the aegis of the State Department.

Mr. Eble said the greatest Russian challenge to the American power industry lies in the technical area. He was extremely impressed by the "dedication, enthusiasm and competence displayed by the people handling the engineering operation and construction at the various establishments we visited. And the mere size, complexity and number of the projects we saw indicated the wealth of engineering and technical talent that has been brought to bear on this basic phase of their industrial activity."

"Our ability to meet the Soviet challenges in the electric power as in other fields hinges importantly on our continuing success in developing new engineering talent. In the electric power field, the problem of attracting a reasonable share of the highly competent young engineers has been increasing. Unless it is solved," Mr. Eble asked, "where can we expect to find the kind of engineering leadership that will enable us to maintain our technical pre-eminence in this field."

Turning to his observations in Russia, Mr. Eble said the Russians have joined us in the conclusion that hydro power is more economical than thermal power "only under the most favorable conditions." Russia has more than three times the potential hydro capacity as the United States, but four-fifths of it is in Siberia, far from centers of civilization, he observed.

"In the generation of thermal power the Russians appear to lag well behind

the United States," Mr. Eble said. "Both in the use of large-scale generating units and in the use of extremely high steam temperatures, the Russians are behind the United States and their plants cannot help but suffer relative inefficiency."

Russia now has one 5,000 kilowatt and a 100,000 kilowatt atomic generating plant in operation, with three under construction. "By comparison, we have three plants in operation, fourteen scheduled for completion between now and the end of 1963, and several more are planned," he said.

Because of the distance between load centers at cities and hydro plants, high voltage transmission is a necessity there. In 1958 they had 2,600 miles operating at 400,000 volts and are constructing an 800,000 volt line from the Stalingrad hydro station to the Don Basin, 300 miles away. It is expected to be completed in 1962.

In the United States, the highest transmission voltage is 345,000 volts. Our next step will probably be 460,000 to 500,000 volts. Tests are under way here on 500,000 and 750,000 volt lines. In the use of electricity, Russia concentrates on industry which uses 80 per cent of the total produced, leaving "a mere 20 per cent for residential, farm and all other uses." The average Russian home used 400 kilowatt-hours per year, in contrast to our 3,400. Mr. Eble said that he had heard of no Russian plans to alter this picture.

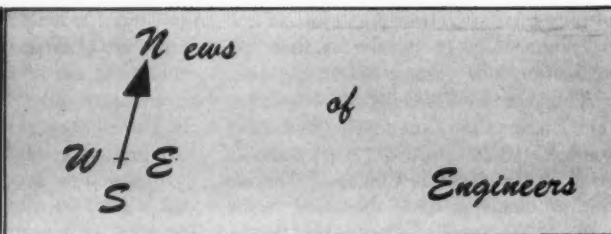
"Looking back over our trip," he said, "I think we can be comforted by the substantial qualitative and quantitative lead we hold in this vital industrial area. On the other hand, I saw nothing that would encourage complacency on our part."

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Western Society member **John P. Donovan**, consulting structural engineer, announces that he has moved his office to 5417 W. Addison Street, Chicago, Illinois. His telephone is now AVenue 3-8430.

Mr. Donovan is Chairman of the WSE Noon Luncheon Committee and is responsible for the tremendous success of our Wednesday luncheon meetings. He is also active with the Civic Committee and the Hydraulic, Sanitary and Municipal Engineering Section of WSE.



J. P. Donovan

A native Chicagoan, Mr. Donovan earned his B.S. and M.S. degrees in Civil Engineering at Illinois Institute of Technology. He served as a Naval deck officer in World War II.

Prior to entering private practice Mr. Donovan was assistant Chief Structural Engineer for the Sumner Sollitt Company. In this capacity he supervised the structural design and field inspections of many industrial and commercial buildings. He has also been employed by the firms of Sargent and Lundy, and A. J. Boynton and Company.

In addition to his private engineering practice Mr. Donovan is an instructor in the Mechanics Department of the Illinois Institute of Technology.

Spaulding A. Norris has been appointed to the newly-created post of vice-president in charge of sales and elected to the Board of Directors of Yeomans Brothers Company, Melrose Park, Ill., manufacturers of pumping and waste treatment equipment.

Norris, an experienced mechanical and hydraulic engineer, joined the Yeomans organization in 1950 as Assistant Sales Manager of the pump division,

moving up to Division Sales Manager in 1952. Since 1958, he has served as General Sales Manager, coordinating and developing the Company's municipal, industrial and residential products divisions.

Richard B. Taylor has been promoted to the position of administrative supervisor in mechanics research at Armour Research Foundation of Illinois Institute of Technology.

He became affiliated with the Foundation in December, 1958. Previously he had been associated with Joy Manufacturing Co.

Taylor's scope of activities includes budgetary forecasts, personnel, account-

ing, and monitoring existing programs. He is a graduate of Notre Dame University.

At the annual meeting in New York of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Dr. Paul G. Shewmon, assistant professor of Metallurgy at Carnegie Institute of Technology, Pittsburgh, was a double award recipient. He received the Alfred Noble Prize and the Rossiter W. Raymond Memorial Award. The Alfred Noble Prize is sponsored jointly by the American Society of Civil Engineers, AIME, The American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the

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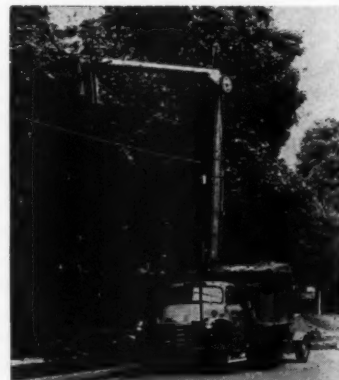
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Western Society of Engineers. The Raymond Award is given by AIME. The Alfred Noble Prize and the Raymond Award both recognize technical papers of outstanding merit.

George E. Olson, of Marengo, a supervising engineer with the Illinois Bell Telephone Company, recently marked 40 years' service with the company.



G. E. Olson

Olson, who started with Western Electric Company in 1920 as an inspector, transferred to Illinois Bell as an engineer and helped engineer the equipment for Chicago's first two dial exchanges, STate and CEutral, in 1923.

He has been "project engineer" for conversion of many Chicago manual exchanges to dial operation. One of his latest assignments was to engineer a new system which permits Chicago public phone users to dial their own calls direct to many suburbs.

Olson is registered as a professional engineer in Illinois and is a member of the Western Society of Engineers. He also belongs to the Masonic Order and the Telephone Pioneers of America, an organization of veteran telephone workers.

A World War I army veteran of the 33rd Division, Olson is a member of the American Legion. He attended Northwestern University and Illinois Institute of Technology.

He and his wife, Dorothy, have two grown children, Mrs. Robert P. Darlington of Pullman, Wash., and Mrs. Robert S. Dredge of Galesburg, Ill.

G. J. Landers has been named to the newly created position of manager—marketing department of Blaw-Knox Company's Construction Equipment Division, according to an announcement by D. F. Jurgensen, vice-president and general manager of the division.

Formerly assistant to the director of marketing for a New York air brake manufacturer, he is responsible for the division's advertising, sales promotion, market research, and sales analysis.

A member of the American Marketing Association, Mr. Landers received his

The Wednesday Noon Luncheon Meetings which have been such a hit this last year will continue all through the summer.

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bachelor's degree from New York University and his master's degree from Columbia University. He is a native of New York City.

Mr. Landers' headquarters are in Mattoon, Ill., where Blaw-Knox Company's Construction Equipment Division headquarters and production facilities are located.

Paul Weir, member of the Western Society and chairman of the Board of the Paul Weir Company, Inc., Chicago, returned March 25, from a unique technical mission to Coalbrook, Orange Free State, South Africa, scene of the disaster which occurred on Jan. 21, 1960 and which claimed the lives of 436 miners.

Mr. Weir was engaged by the owners, the Clydesdale Collieries Limited, to join Sir Andrew Bryan, British coal mining authority, to investigate probable causes and to make recommendations.

The two experts agreed that the disaster at the North Colliery was caused by an unprecedented fracture of the overlying strata, resulting in the collapse of an area of mine workings approximately 1,000 acres in extent. This colliery was developed 50 years ago and has operated continuously. No disaster of a similar nature has ever occurred in this coal field.

Mr. Weir is the only living American honorary member of the United King-

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dom's Institution of Mining Engineers. Sir Andrew is also an honorary member. Mr. Weir is past chairman of the Coal Division of the American Institute of Mining and Metallurgical Engineers, and an Erskine Ramsay gold medallist.

Russ Henke ASSOCIATES, Milwaukee area consulting engineering firm, has just announced that Mr. Russell Henke, has been named "American Correspondent" for the British magazine, *Hydraulic Power Transmission*. The assignment will involve the gathering of materials and the writing of articles on new fluid power developments for publication in England.

Mr. Henke has previously authored about 18 published articles on engineering subjects for the America technical press.

In addition to this assignment, Mr. Henke is chairman, Industrial Advisory Committee for Hydraulics, at the Milwaukee School of Engineering, and is interested in the formation of the proposed new Fluid Power Society.

Harry L. Buck, formerly vice president and general manager, has been elected executive vice president — a newly created post — by the board of directors of I-T-E Circuit Breaker Company, Philadelphia.

At the same time, A. E. Mackenzie, previously vice president and general manager of I-T-E's Kelman Power Circuit Breaker Division, Los Angeles, Calif., was elected to the newly established position of vice president-power equipment.

Buck has been with I-T-E for 25 years, serving as treasurer for nine years before he was named vice president and general manager in 1955.

He is a director of the firm and two of its Canadian subsidiaries, Eastern Power Devices, Ltd., Port Credit, Ontario, and Canadian Porcelain Company, Ltd., Hamilton, Ontario.

He is a trustee of Drexel Institute of Technology, Philadelphia.

Mackenzie will be responsible for overall operations of I-T-E divisions which produce power equipment for utility, industrial and commercial applications. The power equipment includes high and low voltage switchgear, switchboards and switching equipment, unit substations, transformers, bus systems and related apparatus.

National Inventions Exhibition

Creative people, whose ideas have gathered dust because they could find no one to produce or finance them, are now shaking off their patent papers and rummaging through the basement for their models and samples.

Occasion for this revitalized interest is the National Inventions and New Products Conference & Exhibition to be held in Cleveland (Ohio) during the week of June 20-24.

Dozens of letters and patented ideas are being received every day from all over the nation from persons interested in marketing and merchandising their inventions by the Cleveland Engineering Society, 80-year-old professional organization sponsoring the activity. Companies have assigned patents, or patents for licensing, are also presenting descriptions for consideration as suitable for exhibition.

A selection committee will evaluate each patented idea on the following basis: that it is a practical product which 1) definitely fills a specific human need; and 2) is clearly better than other comparable products.

Instructions for submitting patents as detailed by Conference General Chairman Joseph H. Gepfert, Reliance Electric & Engineering Co., pointed out that all material to be considered for review must be submitted in writing no later than June 1, 1960.

Copies of the patent papers, or a resume, will be sufficient for the committee to make selections. If available, a commercial description will also be helpful, and it should be made known if a full scale unit or model is available and if operating or non-operating.

Under no circumstances should the original patent papers be sent. All material submitted will become the property of the Cleveland Engineering Society and can not be returned.

Non-patented items, ideas, or processes will not be acceptable unless submitted with a "Disclosure Form" which is available by writing the Society.

An exhibitor's fee of \$8.00 will be charged for inventions accepted for exhibit by the committee. In addition to the exhibitor's fee, any transportation and handling charges must be paid by the individuals or companies exhibiting. Special display instructions will be sent

to all people having inventions accepted by the Selections Committee. No entry fee is charged for submitting ideas and patents to go before the Selections Committee.

If their ideas survive a screening by the committee, inventors and companies will have an opportunity to place them before a national audience and possibly to locate a manufacturer or investor to make their ideas a reality.

The overwhelming interest in the National Inventions and New Products Conference & Exhibition is not surprising to the men behind this activity. As General Chairman Gepfert points out, less than three per cent of the patented inventions ever reach this country's market shelves or ever appear in the all important gross national product figure.

Principal reason, he believes, is because inventors and other creative people, manufacturers and investors, have no common meeting ground to probe

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each other's interests. The National Inventions and New Products Exhibition, to be held in the Society's unique two-million dollar Cleveland Engineering and Scientific Center, will provide a professional roof to which people can bring their creations to be seen by people who can use them.

In addition to the Exhibition, the week-long activity will also feature five days of national speakers covering the need for inventions and new ideas, the technique of creation, patents and idea protection, research and development of ideas and new products, selling and marketing new ideas, and the importance of innovators to our national economy.

Anyone interested in further information on the exhibition or the detailed conference program may secure it by writing to the National Inventions and New Products Conference & Exhibition, Cleveland Engineering and Scientific Center, 3100 Chester Ave., Cleveland 14, Ohio.



On April 6, 1960, E. H. Gaylord, right, Professor of Civil Engineering, University of Illinois, spoke on "Plastic Design." His discussion covered some of the uses of plastic design and touched on the theory. George C. Harris, left, will be the Noon Luncheon Chairman for the 1960-61 year.



Dr. Gilbert F. White, Professor of Geography, University of Chicago, speaker on April 20, posed the question: "Are Engineers Increasing Flood Damages?"



"Urban Redevelopment" was the subject of Architect Harry Weese's talk before the Western Society's Noon Luncheon Meeting of April 27.

Dust-repellent Paint

A dust-repellent for paint and a water-repellent for clothing are promising new developments, reveals *Product Engineering*. The paint-protector is a colloidal silica preparation that "fills the pores of a paint surface to produce a slickness so total that there is virtually nothing for dirt to adhere to." The water-repellent treatment "withstood seven days of continuous 24-hours rainfall without showing any water penetration."

Long-life Battery

An alloy of lead-antimony has been used as a battery grid, giving a life service of 14 years. Substitution of calcium as the alloy, however, has increased life of the battery to 25 years he said. It will also serve as liaison for the exchange of information, research, and new methods between members.

Anti-insect Paint

A paint that kills insects which alight on it recently has been developed, reports *Purchasing Week*. The paint is applied by conventional techniques.



"How Successful Has the St. Lawrence Seaway Been?" asked William B. Miller, left, partner in the firm of Lord, Bissel & Brook. Mr. Miller proceeded to reply. Loren Trimble, right, seems to convey the general satisfaction felt with the speaker.



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